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ADOMIAN DECOMPOSITION METHOD IN THE THEORY OF NONLINEAR BOUNDARY VALUE PROBLEMS WITH DELAY IN THE CRITICAL CASE

We obtained constructive conditions for the solvability and a scheme for constructing solutions of a nonlinear boundary value problem with concentrated delay in the case of parametric resonance using the Adomian decomposition method. The original function of the differential system with delay contains an unknown eigenfunction that ensures the solvability of the weakly nonlinear boundary value problem [1,2]. By employing the Adomian decomposition method [3], we derived conditions for solvability and constructed a new iterative scheme to find solutions of the weakly nonlinear boundary value problem for a system of differential equations with delay, as well as its eigenfunction in the case of parametric resonance. We obtained constructive convergence conditions for the constructed iterative scheme towards the solution of the weakly nonlinear boundary value problem, as well as its eigenfunction. The research scheme for investigating boundary value problem with concentrated delay can be extended to matrix boundary value problems with concentrated delay [4].

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